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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/722,929	11/26/2003	Joseph P. Rynd	25226A	1182

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EXAMINER	
WOLLSCHLAGER, JEFFREY MICHAEL	
ART UNIT	**PAPER NUMBER**
1732	
MAIL DATE	**DELIVERY MODE**
07/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/722,929	RYND ET AL.	
	Examiner	Art Unit	
	Jeff Wollschlager	1732	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16,21 and 23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16, 21 and 23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 5, 2007 has been entered.

Response to Amendment

Applicant's amendment to the claims filed February 26, 2007 has been entered. Claim 24 has been canceled. Claims 1, 3, 13, and 21 are currently amended. Claims 17-20 and 22 were previously canceled. Claims 1-16, 21 and 23 are pending and under examination.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grinshpun et al. (WO 2001/39954) in view of Lee et al. (U.S. Patent 6,759,446).

Regarding claim 1, Grinshpun et al. teach a method of manufacturing a rigid foam (Figure 6; page 10, lines 5-30) comprising: incorporating fillers and reinforcing materials such as graphite, conductive carbon black and nanofillers into a polymer (page 17 lines 12-20) and at least one nucleating agent (page 19, line 38 – page 20, line 5), incorporating a blowing agent into the melt under a first pressure and a first temperature (page 20, lines 7-30), extruding the polymer melt under a second pressure and temperature to allow the polymer melt to expand and foam, and cooling the foamed product (page 21, lines 9-30) to produce a foam consisting primarily of blends of polystyrene (page 14, line 41-page 15 line 4; page 24), with a cell size ranging from 25 to 7000 micrometers (page 23, lines 11-15). Grinshpun et al. do not explicitly teach that the nano-particles/nano-fillers employed are nano-clays, intercalated or expanded graphite or the particle size of the fillers and reinforcing materials.

However, Lee et al. teach an analogous method of producing a rigid foam product where nano-clays are utilized (col. 1, line 41-col. 2, line 55) with a thickness of <1 nanometer (nm) (col. 1, line 50-58).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to have employed the nanoclays disclosed by Lee et al. while practicing the method of Grinshpun for the purpose, as suggested by Lee et al., of improving the physical properties of the foam (col. 1, line 41 – col. 2, line 22).

As to claims 2-4, Grinshpun teaches blends primarily comprising polystyrene (page 14, line 41-page 15 line 4; page 24).

As to claims 5 and 6, Grinshpun teaches various blowing agents may be employed (page 18, lines 6-30).

As to claims 7, 8, and 16, Grinshpun teaches incorporating additives into the polymer melt such as nucleation agents, fillers and pigments (page 17, lines 12-20; page 19, line 38 - page 20, line 30).

As to claims 9-13, Lee et al. teach a method of manufacturing a rigid foam according to the method of claim 2, wherein the nano-particles are nano-Montmorillonite intercalated with polystyrene nano-clays used in the range of 0.5 – 5%, based on polymer weight (col. 1 lines 50 – 66 and col. 2 lines 43-65).

As to claims 14 and 15, Grinshpun teaches the foam has a density of 8 to 640 kg/m^3 (page 13, lines 4-22; page 24, lines 25-37) and that the cell size is between 25 and 7000 micrometers (page 23, lines 11-15). Grinshpun is silent as to the other cell structure parameters. However, the method taught by Grinshpun in view of Lee teaches the method of claim 2 as discussed in the 103(a) rejection above. As such, it follows that the foam produced necessarily has the same claimed effects and physical properties.

Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al. (WO 01/40362) in view of Kresta et al. (US 6,518,324).

Regarding claim 1, Miller et al. teach the basic claimed process of producing an extruded rigid foam to yield an insulating panel (page 10, lines 21-24) wherein a blowing agent is incorporated into the polymer melt at a first pressure and temperature (page 6, line 5-31); extruding the polymer melt under a second pressure and temperature to form a foam and intrinsically cooling the foam to form a product with a cell size within the claimed range (page 2, line 19-page 3, line 24; page 9, line 13-page 10, line 25). The preferred polymer melt includes

an alkenyl aromatic polymer material, such as polystyrene (page 3, line 25- page 4, line 28). Miller et al. further that optional additives may be included to obtain desired foam characteristics (page 5, lines 8-15), but do not disclose incorporating nanoparticles as claimed.

However, Kresta et al. teach employment of nanoclays in polymer foams, such as polystyrene foam, having a thickness of about 3 – 1000 Angstroms (Abstract; col. 1, line 10 – col. 2, line 15).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to have employed the nanoclays disclosed by Kresta et al. in the method disclosed by Miller et al., for the purpose, as suggested by Kresta et al. of producing a foam with improved thermal insulation values (Abstract).

As to claims 2-4, Miller et al. preferably employ polystyrene at greater than 95% and blending with a non-alkenyl aromatic polymer (page 3, line 25- page 4, line 23).

As to claim 5 and 6, Miller et al. disclose carbon dioxide as well as various other blowing agents (page 6, line 5- page 7, line 18).

As to claims 7 and 8, Miller et al. disclose adding the additives to the resin/foamable gel (page 5, lines 8-15) and include plasticizers and flame-retardants.

As to claims 9-13, Kresta et al. disclose plate-like nano-montmorillonite at a weight range from 0.01 to 10 part per hundred (col. 1, line 44-col. 2, line 15). The nanoclays are extruded with a major portion of polystyrene (Kresta: col. 1, lines 62-67 and Miller: page 3, line 25 – page 4, line 23).

As to claims 14 and 15, Milller et al. recite some of the physical properties of the foam (page 9, lines 13- page 10, line 27). Further, the combination teaches the same claimed process with the same claimed materials. It follows that the method produces a product with the same claimed physical properties and effects.

As to claim 16, Miller et al. disclose employment of titanium dioxide and talc at levels below 2% by weight (page 5, lines 2-5).

Claims 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al. (WO 01/40362) in view of Moy et al. (US 6,699,454) or Adedeji et al. (US 6,815,491).

Regarding claim 21, Miller et al. teach the basic claimed process of producing an extruded rigid foam to produce an insulating panel (page 10, lines 21-24) wherein a blowing agent is incorporated into the polymer melt at a first pressure and temperature (page 6, line 5-31); extruding the polymer melt under a second pressure and temperature to form a foam and intrinsically cooling the foam to form a product with a cell size within the claimed range (page 2, line 19-page 3, line 24; page 9, line 13-page 10, line 25). The preferred polymer melt includes an alkenyl aromatic polymer material, such as polystyrene (page 3, line 25- page 4, line 28). Miller et al. further that optional additives may be included to obtain desired foam characteristics (page 5, lines 8-15) and employ talc and titanium dioxide as nucleating agents (page 4, line 30-page 5, line 5; page 1, line 28-34), but do not disclose incorporating acicular nanoparticles as claimed.

However, Moy et al. (Abstract; col. 1, lines 47-col. 2, line 48) and Adedeji et al. (Abstract; col. 2, lines 35-57; col. 4, lines 38-66; col. 9, lines 18-35; col. 10, lines 16-66; col. 15, lines 31-57) individually teach employment of reinforcing fillers suitable for foam applications in the form of elongated fibers (i.e. acicular in shape).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to have employed the reinforcing materials disclosed by either of Moy et al. or Adedeji et al. in the method disclosed by Miller et al. for the purpose as disclosed individually by each of Moy et al. and Adedeji et al. of reinforcing the foam and for the

purposed disclosed by Moy et al. of improving the insulation properties of the foam (col. 1, line 47-col 2, line 14).

As to claim 23, the combination teaches the method as set forth above. It follows that the foam produced necessarily has the same claimed effects and physical properties.

Claims 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grinshpun et al. (WO 2001/39954) in view of Moy et al. (US 6,699,454) or Adedeji et al. (US 6,815,491).

Regarding claim 21, Grinshpun et al. teach a method of manufacturing a rigid foam (Figure 6; page 10, lines 5-30) comprising: incorporating fillers and reinforcing materials such as graphite, conductive carbon black and nanofillers into a polymer (page 17 lines 12-20) and at least one nucleating agent (page 19, line 38 – page 20, line 5), incorporating a blowing agent into the melt under a first pressure and a first temperature (page 20, lines 7-30), extruding the polymer melt under a second pressure and temperature to allow the polymer melt to expand and foam, and cooling the foamed product (page 21, lines 9-30) to produce a foam consisting primarily of blends of polystyrene (page 14, line 41-page 15 line 4; page 24), with a cell size ranging from 25 to 7000 micrometers (page 23, lines 11-15). Grinshpun does not specify the shape (e.g. acicular) or particle size of the fillers and reinforcing materials.

However, Moy et al. (Abstract; col. 1, lines 47-col. 2, line 48) and Adedeji et al. (Abstract; col. 2, lines 35-57; col. 4, lines 38-66; col. 9, lines 18-35; col. 10, lines 16-66; col. 15, lines 31-57) individually teach employment of reinforcing fillers suitable for foam applications in the form of elongated fibers (i.e. acicular in shape).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to have employed the reinforcing materials disclosed by either

of Moy et al. or Adedeji et al. in the method disclosed by Grinshpun et al. for the purpose as disclosed individually by Moy et al. and Adedeji.et al. of reinforcing the foam and for the purposed disclosed by Moy et al. of improving the insulation properties of the foam (col. 1, lines 47-col 2, line 14).

As to claim 23, the combination teaches the method as set forth above. It follows that the foam produced necessarily has the same claimed effects and physical properties.

Response to Arguments

Applicant's arguments filed April 5, 2007 regarding the rejections over the Nitzsche and Glicksman references have been considered but are moot in view of the amendment to the claims. However, a new ground of rejection has been made as set forth above.

Applicant's arguments filed April 5, 2007 regarding the rejection over Grinshpun in view of Lee have been fully considered, but they are not persuasive.

Applicant's arguments appear to be on the following grounds:

1. One of skill in the art would not be motivated to utilize the nanoparticles disclosed by Lee in the method of Grinshpun to achieve the claimed invention having a cell size greater than 60 microns.

2. There would be no reasonable expectation of success to employ the nanoparticles disclosed by Lee and achieve the claimed particle size of greater than 60 microns since Lee produces a foam with a cell size less than 20 microns.

The arguments are not persuasive for the following reason:

1. Grinshpun et al. teach the cell size of the foam to be produced ranges from 25 to 7000 microns, preferably from 50 to 5000 microns, and more preferably from 100 to 1500 microns (page 23, lines 11-15). Further, Grinshpun et al. exemplify a cell size of 250 microns

(Example 1). Grinshpun et al. further teach that nanometer sized materials can be employed as fillers and further teach the fillers may be clays (page 17, lines 12-20).

Lee teach employment of nanoclays with a thickness of < 1nm, meeting the claim limitation of less than 100 Angstroms, that are applied to modify cellular foams in order to increase their mechanical strength, thermal stability, flame retardance and barrier resistance (col. 1, lines 41-57). The examiner maintains that the references themselves provide the motivation to combine the references. One having ordinary skill would have been motivated to achieve the benefits recited by Lee in the practice of the method disclosed by Grinsphun.

2. As discussed in the response above, Grinshpun teaches nanometer sized fillers and clays may be employed while still achieving the recited cell size. Further, Lee teaches that "cell size can vary widely depending on operating conditions" and that it is "preferred that the polymeric nanocomposite foam has an average cell size of les than 20 microns" (col. 4, lines 23-28, emphasis added). Further, the abstract of Lee teaches that the cell size is controlled by carbon dioxide content, melt temperature and the pressure drop rate. Additionally, Grinshpun teaches controlling the cell size within the desired range by adjusting the amount of nucleating agent (page 19, line 38-page 20, line 5).

In general, the examiner acknowledges that the addition of a nanoclay to the foam of Grinshpun would have some impact on the resulting cell size of the foam when compared to an identical foam absent a nanoclay. However, it is the examiner's position that one having ordinary skill in the art would have had a reasonable expectation of success when employing the nanoclays disclosed by Lee in the method of Grinshpun. Both Grinshpun and Lee disclose various ways to adjust/control cell size to desired levels (e.g. nucleating agents – type and amount, carbon dioxide levels, temperature, pressure drop). These adjustment means would

have been readily manipulated and optimized as required and suggested by the references to offset any impact the nanoclay would have had on the cell size.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Wollschlager whose telephone number is 571-272-8937. The examiner can normally be reached on Monday - Thursday 7:00 - 4:45, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on 571-272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CHRISTINA JOHNSON
SUPERVISORY PATENT EXAMINER
6/29/07

Jeff Wollschlager
Examiner
Art Unit 1732

June 28, 2007